CLIMATE CHANGE ANNUAL REPORT, 2014

California Department of Water Resources

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FIELD STUDIES

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Paleohydrology

Sponsor/Program Manager	John Andrew
Project Manager	Jeanine Jones

Project Objective:

Use paleoclimate information to better understand natural climate variability & develop analog years

Project Description:

The Department executed a contract with the University of Arizona for development of tree-ring reconstructions of paleostreamflows in the Sacramento, San Joaquin, and Klamath River Basins. Extending streamflow records beyond the relatively short period of the historical record provides an improved picture of climate variability and yields data for use in operations model sensitivity analyses and for vulnerability analyses. Very limited fieldwork under the contract began in fall 2010; the final report will be completed in 2014. Additionally, with funds provided by USBR, the University is developing a database of climate analog years for DWR including the paleo data.

Funding Information:

Project Budget:	$400,000 DWR/$200,000 USBR	**Funding Source:**	Prop 84

Project Start Date:	2010	**Project End Date:**	2014

External Partners:

University of Arizona, US Bureau of Reclamation

Project Accomplishments for 2014:

The final report, Klamath/San Joaquin/Sacramento Hydroclimatic Reconstructions from Tree Rings, was released in February, 2014: http://www.water.ca.gov/waterconditions/docs/tree_ring_report_for_web.pdf

Project Deliverables/Timeline:

1. Reconstructed streamflows for Sacramento, San Joaquin, and Klamath Rivers
2. Database of analog climate years

Customers:

DWR Drought program, Calsim modelers, DFM hydrology branch, Climate Change Program and website

PLANNING, MODELING, AND DATA COLLECTION

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Technical Advisory Group (CCTAG)

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn

Project Objective:

An external panel of expert advisors provides Department-wide guidance for Climate Change Scenario selection and methodology for the California Water Plan and various Department planning efforts and projects, future flood needs, and IRWM support.

Project Description:

The CCTAG advises DWR on the scientific aspects of climate change, its impacts on water resources, the use and creation of planning approaches and analytical tools, and the development of adaptation responses. A standing technical advisory group on climate change impacts and adaptation serving all DWR programs provides external guidance and support for a variety of climate-related issues, including scientific review of climate change models and scenarios, interpretation of scientific information produced by the National Climate Assessment and the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, and informing DWR's climate change adaptation policies. Benefits include consistency in the scientific advice the Department receives on climate change, and the administrative efficiency of not having redundant climate change advisory groups across the Department. The Department's Climate Change Program oversees and coordinates the CCTAG.

Funding Information:

Project Budget:	$300,000	**Funding Source:**	Prop 84

Project Start Date:	2011	**Project End Date:**	DATE IN PROGRESS N/A March, 2015

External Partners:

California Water Plan Statewide Water Analysis Network, State Climatologist Office

Project Accomplishments for 2014

CCTAG members were chosen in 2013 from solicited statements of qualification by a technical review committee within DWR, and announced on February 13, 2012. A group of external experts will serve the Department for a three-year volunteer term, commencing in 2012. Specialties of panelists include: Atmospheric science; Hydrology; Civil Engineering/Infrastructure; Environmental science; Climate data and statistics; Social science; Resource Economics; Land use planning; and Climate modeling. CCTAG members are:

Holly Alpert, Inyo-Mono Integrated Regional Water Management Program
Michael Anderson, State Climatologist (DWR)
Barney Austin, INTERA Incorporated
Dan Cayan, Scripps Institution of Oceanography
David C. Curtis, WEST Consultants, Inc.
Mike Dettinger, Scripps Institution of Oceanography
Guido Franco, California Energy Commission
Konstantine Georgakakos, Hydrologic Research Center/ Scripps Institution of Oceanography
John Gyakum, McGill University
Al Herson, Sohagi Law Group
Ruth Langridge, University of California, Santa Cruz
M. Lev Kavvas, UC Davis
Kelly Redmond, Western Regional Climate Center
Sarah Young, Santa Clara Water District

The CCTAG met in 2014 in person March 3, July 27, and November 19 and on monthly conference calls. 2014 accomplishments included development and substantial progress on a draft document that will provide guidance and perspectives on climate change science and analysis to DWR. The report is expected to be completed by the end of the CCTAG volunteer term in March, 2015.

The materials for all CCTAG meetings are posted on devoted the public website:
http://www.water.ca.gov/climatechange/cctag.cfm

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

California Water Plan Update – Climate Change (CWP)

Sponsor/Program Manager	John Andrew, Paul Massera, Lew Moeller
Project Manager	Elissa Lynn

Project Objective:

Provide greater detail and regionally specific climate change information in Update 2013 than in Update 2009, including regionally appropriate and statewide adaptation and mitigation strategies, resource management strategies, and climate change scenarios decision support.

Project Description:

Climate change stems from a steady gradual increase in global temperatures that has been taking place over recent decades. Determining the local impacts of and response strategies to climate change in California involves climate modeling downscaled to the regional level. Current developments in climate science and research can provide guidance for projecting likely ranges of temperatures and precipitation changes by region. Responding to these hydrologic changes and reducing their impact are known as adaptation strategies. Reducing GHG (Greenhouse Gas) impacts by reducing energy consumption are known as mitigation strategies. Many adaptation and mitigation strategies are conducted at the regional level, so CWP update 2013 includes climate change in the regional reports, based on appropriate hydrologic impact, as well as statewide strategies in the broader document. Strategies and vulnerabilities to climate change also appear in the Resource Management Strategies. This project will also be tasked with technical assistance to the Statewide Water Analysis Network choice of scenarios related to climate change impacts. These four approaches to incorporating climate change into CWP 2013 will improve upon the initial steps taken in CWP 2009 to include responses to climate change.

Funding Information:

Project Budget:	$648,000.00	**Funding Source:**	Prop 84

Project Start Date:	2010	**Project End Date:**	DATE IN PROGRESS N/A Climate change content submitted in Dec. 2013, with Water Plan release coming in 2014.

External Partners:

Public Advisory Committee, Statewide Water Analysis Network, Local Water Planners and IRWM's

Project Accomplishments for 2014:

Most draft content for CWP 2013 was finalized in 2013 including climate change content for each Resource Management Strategy, text and graphical content for each Regional Report, adaptation strategies and energy intensity of local water supplies, text and graphical content for two climate change sections of CA Water Today: Climate change and Sea Level Rise, and Water-Energy, climate change references, and content for CWP 2013 Highlights. In 2014, climate change staff worked with CWP staff to address public comments on draft content, finalization of graphics and data. All climate change content for the CWP 2013 volumes 1, 2, and 3 was finalized and released to the public during 2014.

Project Deliverables/Timeline:

Final content was developed as listed in the Accomplishments above.

Customers:

California Water Plan, Public Advisory Committee, State Agency Steering Committee, The Public

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Analysis of Climate Change for the California Water Plan Update

Sponsor/Program Manager	Paul Massera
Project Manager	Rich Juricich

Project Objective:

Quantify alternative scenarios of future water demand and supply conditions and use to evaluate performance of potential water management responses for Water Plan Update 2013

Project Description:

The California Water Plan Update 2013 (CWP 2013) built upon the scenario planning begun in previous Updates and includes an analysis of the performance of different resource management strategies and response packages for the Central Valley under different assumptions about uncertain future conditions. The Water Plan evaluated the effect of different assumptions about uncertain future conditions including climate change on future water demand for all 10 hydrologic regions in California. A wide range of scenarios were developed that reflect uncertainty about future population growth, agricultural land use, climate conditions, water use rates, and other factors.

Uncertain future climate conditions are represented by diverse sequences of temperature and precipitation applied to geographically-disaggregated catchment areas in the Water Evaluation and Planning (WEAP) model. Some sequences were based upon projections of temperature and precipitation from global climate models (Atmosphere-Ocean General Circulation Models—GCMs). Others were based on historical observations and were designed to test the effects of drought conditions experienced in the recent past at different times in the future. The Climate Change Technical Advisory Group (Climate TAG) provided guidance to DWR about which specific sequences to evaluate that reflect a wide range of plausible climatic conditions and include periods of droughts similar to those experienced in recent decades.

A significant improvement to the Water Plan scenarios in Update 2013 is a quantitative look at the uncertainty surrounding future climate change when evaluating the performance of new resource management strategies. After consultation with its Climate Change Technical Advisory Group, DWR chose to include 22 alternative climate scenarios in the evaluation of future strategies. These include 12 climate scenarios identified by the Governor's Climate Action Team (CAT) for future climate change, 5 scenarios repeating historical climate with a severe 3 year drought offset by 10 years, and 5 scenarios repeating historical climate with a warming temperature trend offset by ten years. Each of the climate scenarios has separate estimates of future precipitation and temperature. Collectively these estimates provide planners with a range of precipitation and temperature that might be experienced in the future and are used with other factors to estimate future water demands.

The CWP Update 2013 evaluated 12 sequences of downscaled global predictions of temperature and precipitation, corresponding to the 12 model-emissions scenario combinations selected by the Governor's Climate Action Team (Maurer and Hidalgo, 2008). The GCMs used were:

1. CNRM-CM3 (France)

2. GFDL-CM21 (USA)

3. Micro32med (Japan)

4. MPI-ECHAM5 (Germany)

5. NCAR-CCSM3 (USA)

6. NCAR-PCM1 (USA)

The two emissions scenarios used were the A2 and B1 scenarios:

"The A2 SRES global emissions scenario represents a heterogeneous world with respect to demographics, economic growth, resource use and energy systems, and cultural factors. There is a de-emphasis on globalization, reflected in heterogeneity of economic growth rates and rates and directions of technological change. These and other factors imply continued growth throughout the 21st century of global GHG emissions. By contrast, B1 is a "global sustainability" scenario. Worldwide, environmental protection and quality and human development emerge as key priorities, and there is an increase in international cooperation to address them as well as to convergence in other dimensions. Neither scenario entails explicit climate mitigation policies. The A2 and B1 global emission scenarios were selected to bracket the potential range of emissions and the availability of outputs from global climate models" California Climate Action Team (2009).

Downscaled monthly temperature and climate projections were obtained from the downscaled climate dataset jointly developed by the Lawrence Livermore National Laboratory (LLNL), the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and Santa Clara University (SCU), available at http://gdo-dcp.ucllnl.org. These data were derived from the World Climate Research Programme's (WCRP) Coupled Model Intercomparison Project Phase 3 (CMIP3) multi-model dataset, and include data from 112 different global climate simulations of 16 global models evaluated for three global emissions scenarios. The projections are available from 1950 to 2099.

Funding Information:

Project Budget:	$750,000	**Funding Source:**	Proposition 84

Project Start Date:	July 2010	**Project End Date:**	DATE	IN PROGRESS / N/A
			12/31/2013	X

External Partners:

MWH, RAND Corporation, Stockholm Environment Institute, National Center for Atmospheric Research

Project Accomplishments for 2014:

Project and deliverables completed in 2013, as developed.

Project Deliverables/Timeline:

- Presented information on Water Plan future scenarios to at various venues including
  - March 2014 California Water and Environmental Modeling Forum in Folsom, CA
  - June 2014 Environmental and Water Resources Institute World Congress in Portland, Oregon
- September 2014 - Developed draft charter for future scenarios for Update 2018 of the Water Plan

Customers:

- Department of Water Resources for support of DWR programs and projects
- Local and regional water planning entities for consideration of alternative future scenarios and water management responses
- California Legislature to meet Water Code requirements
- General public for education on future water issues
- Water Plan advisory groups including the Public Advisory Committee, State Agency Steering Committee, Statewide Water Analysis Network, and Regional Forums.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Basic Data Workgroup

Sponsor/Program Manager	Elissa Lynn, Greg Smith, Michael Anderson
Project Manager	Aaron Cuthbertson

Project Objective:

Assessment and coordination of basic climate data collection efforts across DWR

Project Description:

DWR's Climate Change Basic Data group is composed of representatives from DSIWM and the Division of Flood Management, and DWR's regional offices. The project goals are to assess current climate data acquisition efforts at DWR, promote cooperation and coordination across programs, and strategize on issues of data storage, management, and dissemination.

Funding Information:

Project Budget:	$120,000	**Funding Source:**	Prop 84

Project Start Date:	May 2011	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

Western Regional Climate Center

Project Accomplishments for 2014:

No Update for 2014

Project Deliverables/Timeline:

During 2013, the Basic Data workgroup will focus on continued strengthening working relationship with the WRCC, inventorying old climate records in the regional offices, and working on integrating existing data collection and management within DWR. New projects on research into snow and rain trends, using DWR and other data sources will be conducted. DWR volunteer climate data observers will continue to be encouraged to migrate to the CoCoRaHS network.

Customers:

State of California Agencies, General Public, DWR Staff

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Data Collection and Climate Services

Sponsor/Program Manager	John Andrew, Elissa Lynn
Project Manager	Dr. Michael Anderson

Project Objective:

Collect relevant climate data to support Department's emergency response and planning initiatives and monitor for climate change; provide relevant climate data and value added products to general public

Project Description:

In 2011 DWR continued its development of the Flood Emergency Response Information Exchange (FERIX). Efforts are underway to link information presented in FERIX to the climate data in the California Climate Data Archive. FERIX will also house a new map-based server for (former State Climatologist) Jim Goodridge's precipitation Depth-Duration-Frequency curves and annual extremes data sets that make up Bulletin 195. This will greatly facilitate the serving of the data which is currently handled through an ftp site with over 4000 spreadsheets. Data gathering for this effort will be transitioned from Jim Goodridge to DWR in the coming years.

For observing data systems, DWR is continuing its partnership with the Earth Systems Research Lab of the National Oceanic and Atmospheric Administration (NOAA) and Scripps Institution of Oceanography to deploy new monitoring equipment for extreme precipitation events. For this network, water vapor measurements, wind profilers, soil moisture sensors and freezing level radar are being deployed across the state. The data from this network is currently served through NOAA's Hydrometeorology Testbed website at http://hmt.noaa.gov. Efforts continue to get the data into the California Data Exchange Center. Other observing opportunities that are in their initial stages include elements of the Forecast Coordinated Operations Program and the UC Merced observing system in the American River watershed. A new remote sensing monitoring effort using airborne LIDAR measurements of the snowpack is being developed under a joint project between DWR and NASA's Jet Propulsion Laboratory. NOAA has stopped funding for the new Regional Climate Reference Network and is considering streamlining the National Weather Service Cooperative Observer Network.

Funding Information:

Project Budget:		**Funding Source:**	N/A

Project Start Date:	July 2009	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

NOAA ESRL, Scripps, Jim Goodridge

Project Accomplishments for 2014:

No Update for 2014

Project Deliverables/Timeline:

Map based server for B195 data, desktop updating toolkit, full EPN sites with data flow to CDEC

Customers:

DWR, General Public

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Using Downscaled Climate Change Information for Water Resources Planning

Sponsor/Program Manager	Francis Chung
Project Manager	Jianzhong Wang, Hongbing Yin, Francis Chung

Project Objective:

Evaluate Downscaled Climate Model Projection Products for Use in Water Resources Planning

Project Description:

Climate change projections from Global Climate Models (GCMs) typically provide information at a scale that is too large to use for water resource planning. To make the climate change projection information more useful for planning purposes, it is converted to a smaller scale by a process called downscaling. Downscaling methods fall into two categories, statistical downscaling, which is based on historical patterns, and dynamical downscaling, which relies on physical principles and relationships. Both downscaling and the use of downscaled data for water resources planning are evolving areas of research. DWR's activities related to downscaling included:

- Created downscaled data at 2km resolution for California from PRISM-based Bias Corrected Spatial Downscaled (BCSD) data and associated uncertainty estimates
- Comparing dynamical and statistical downscaling methods to better understand the strengths and weaknesses of each method and how that might affect their use for water resources planning purposes
- Generating climate change reservoir inflow projections through a process called double quantile mapping
- Assessing climate change impacts for the Bay Delta Conservation Plan project
- Submitted paper titled "Isolated and integrated effects of sea level rise, seasonal runoff shifts, and annual runoff volume on California's largest water supply" to the *Journal of Hydrology*

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	4/2008	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

N/A

Project Accomplishments for 2014:

No Update for 2014

Project Deliverables/Timeline:

Develop A New Validation Strategy to Climate Change Impact Study Approaches**.** The product: climate model projections for use in climate change impact study on CVP/SWP

Customers:

DWR

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Quasi-decadal Oscillation in the CMIP5 and CMIP3 Climate Model Simulation: California Case

Sponsor/Program Manager	Francis Chung/Erik Reyes & Hongbing Yin
Project Manager	Jianzhong (Jay) Wang

Project Objective:

Investigate if current climate model simulation/projections are able to reproduce the observed oscillation in California climate

Project Description:

The ongoing four drought years in California are reminding us of two other historical long drought periods: 1987-1992 and 1928-1934. This kind of interannual variability is corresponding to the dominating 7-15 year quasi-decadal oscillation (QDO) in precipitation and streamflow in California. When using global climate model projections to assess the climate change impact on water resources planning in California, it is natural to ask if global climate models are able to reproduce the observed interannual variability like 7-15 year quasi-decadal oscillation.

Further spectral analysis to tree ring chronicles and historical precipitation records proves the existence of 14 year quasi-decadal oscillation in California in modern climate. But while implementing spectral analysis to all the CMIP5 and CMIP3 global climate model historical simulations using wavelet analysis approach, it was found that only CESM1-WACCM, have statistically significant 14 quasi-decadal oscillations in California.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	7/1/2014	**Project End Date:**	12/31/2014

External Partners:

n/a

Project Accomplishments for 2014: What did the Project accomplish in 2014?

Gave oral presentation at the 2014 Bay-Delta Science Conference and poster presentation at the AGU 2014 Fall Meeting. A documentation of this project is still in progress.

Project Deliverables/Timeline: What are the current or future objectives of the project? Create a list of tangible products that have/will result(ed) from project.

A scientific paper summarizing this project will be prepared and submitted to a peer-reviewed journal.

Customers:

This work can be referred by DWR other climate change related projects and outside readers.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Sensitivity Analysis of Sierra Nevada and Coastal Range Upper Watersheds to Temperature Changes Using SWAT

Sponsor/Program Manager	Francis Chung
Project Manager	Tariq Kadir

Project Objective:

To develop calibrated rainfall/runoff models for the upper watersheds of the Sierra Nevada and Coastal Range mountains for areas tributary to the Sacramento – San Joaquin Delta and determine impacts on stream outflows caused by air temperature warming of 1^0C to 4^0C.

Project Description:

Physically-based, distributed hydrologic models are essential tools for evaluating long-term hydrologic changes in California. The semi-distributed Soil Water Assessment Tool (SWAT) is being used to develop individual models of eighteen watersheds of the Sierra Nevada and Coastal Range mountains for areas Tributary to the Sacramento – San Joaquin Delta. A common and consistent database of digital elevation, land use, soil and climate data are used with GIS to develop the SWAT models. Model calibration and validation are based on observed or reconstructed monthly unimpaired streamflows at the watershed outlets. The parallel optimization package is used in model calibration. The calibrated models will be used to study the effect of imposed warming of 1^0C to 4^0C on the hydrology of these source watersheds and their impacts on water supply of the Central Valley of California.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	2010	**Project End Date:**	DATE: X IN PROGRESS: N/A:

External Partners:

None

Project Accomplishments for 2014:

No Update for 2014

Project Deliverables/Timeline:

Tangible Products to date:

1. Computer based rainfall/runoff models for 17 watersheds in the Sierra Nevada and Coast Range mountains have been developed and calibrated for outflows based on observed or reconstructed streamflows.
2. For seven of the watersheds temperature warming of 1^0C to 4^0C was imposed and impacts on outflows determined.

Future Products:

1. Development and calibrated computer based rainfall/runoff models for other minor watersheds in the Sierra Nevada and Coastal Range mountains and determining impacts of imposed warmings on outflows.
2. A pre-development C2VSIM integrated model for Central Valley, to be coupled with SWAT or BCM models for climate change study.
3. Use the developed models to determine the impacts of potential global warming using downscaled GCM results as input.

Customers:

Federal, State, Local, and Private stakeholders in California interested in the impacts of potential climate change on stream flows for areas tributary to the Sacramento – San Joaquin Delta.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Incorporating Climate Change into the 2017 Central Valley Flood Protection Plan

Sponsor/Program Manager	Michael Mierzwa, Division of Flood Management,
Project Manager	Mary Jimenez, Division of Flood Management, Mary.Jimenez@water.ca.gov

Project Objective:

The 2017 Central Valley Flood Protection Plan needs to incorporate Climate Change into its planning scenarios. The goal of the 2017 CVFPP is to Improve flood risk management in the Central Valley by making improvements to the facilities of the State Plan of Flood Control (SPFC) which is a 1,600 mile system of levees, weirs, bypasses and pumping plants along the Sacramento and San Joaquin Rivers in California's Sacramento and San Joaquin valleys. The CVFPP will be informed by three planning efforts: Sacramento and San Joaquin Valley Basin-Wide Feasibility Studies, the eco-system Conservation Strategy, and six Regional Flood Management Plans. The 2012 CVFPP had a Climate Change strategy and the 2017 CVFPP is updating the Climate Change strategy. More specifically, improving flood risk management will be achieved through the promotion of multi-objective projects, improving facility operations and maintenance, restoration of ecosystem functions, and improving institutional support. Implementation of the 2017 CVFPP will accomplish: improvements to public safety (save lives), reduced expected annual damages, target species recovery, and improved ecosystem services.

Project Description:

In order to achieve a more resilient Central Valley flood management system whose principal component is the State Plan of Flood Control, climate informed hydrology needs to be incorporated into the CVFPP planning process. The CVFPP Climate Change approach is using the latest science and is designed to be flexible to incorporate new information as it is made available. The process involves integrating information related to atmospheric rivers, general atmospheric circulation models and temperature data that leads to the development of watershed models that can be used to develop hydrographs for various return periods. The Climate Change hydrology is being developed using scientifically supported global climate projections and in coordination with ongoing climate research and the results of that research including data from the USACE, NOAA, USGS, UC Davis and Scripps. As part of the CVFPP Climate Change analysis, a series of Climate Change scenarios are being developed by varying temperature and precipitation changes and changes to flow-frequency curves. Preliminary results show that changes in flood volumes due to modeled Climate Change scenarios will not be uniform across the watersheds. Current efforts focus on converting computed unregulated flows (flows upstream of flood control reservoirs) to regulated flows (flows downstream of reservoirs).

Funding Information:

Project Budget:	$	**Funding Source:**	Proposition 1E and small amount of General Fund.

Project Start Date:	July 2012. Work on the 2017 Central Valley Flood protection Plan (CVFPP) was begin immediately after the adoption of the 2012 CVFPP by the Central Valley Flood Protection Board. Climate Change analysis was incorporated in the 2012 CVFPP and is being updated for the 2017 CVFPP.	**Project End Date:**	DATE IN PROGRESS N/A

External Partners:

CVFPB, DFW, DSC, DPC, Delta Conservancy, USACE, USFWS, BDCP (Water Fix-Eco Restore), Central Valley cities and counties, and Central Valley flood management and levee maintaining agencies.

Project Accomplishments for 2014:

Preliminary climate change informed hydrology has been developed for the rivers and streams that affect and are adjacent to the levees and other facilities of the State Plan of Flood Control.

Project Deliverables/Timeline: What are the current or future objectives of the project? Create a list of tangible products that have/will resulted) from project.

Incorporate climate change informed hydrology into Central Valley flood planning process (CVFPP) to ensure project goals of achieving sustainable 200-year urban level of flood protection is achieved for urban and urbanizing communities that are protected by the levees of the SPFC; and that sustainable 100-year level of flood protection is achieved for small communities protected by the levees of the SPFC.

Customers:

Central Valley Flood Protection Board, Central Valley cities and counties, Central Valley residents, levee maintaining districts/agencies

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Represent DWR in Interagency and Stakeholder Groups

Sponsor/Program Manager	John Andrew, Elissa Lynn
Project Manager	Regional Climate Staff

Project Objective:

For regional DWR staff to represent DWR in a variety of interagency and stakeholder groups within California

Project Description:

Federal, state, and local agencies, as well as other entities, have been convening workgroups to facilitate discussions in preparing for climate change, to understand the dynamics of water management and the interaction with managing other resources, and to implement the measures identified in the *2009 California Climate Adaptation Strategy* and in subsequent updates (such as *Safeguarding California: Reducing Climate Risk*). Regional DWR staff represents DWR in these discussions, communicates the agency's perspectives, provides technical expertise and climate change resources, and reports to the Climate Change Program on relevant information that DWR can use in its own departmental activities.

Funding Information:

Project Budget:	$60,000/year	**Funding Source:**	Prop 84

Project Start Date:	January, 2010	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

Federal, state, and local agencies, water and electrical providers, teachers, and non-profit entities

Project Accomplishments for 2014:

Regional DWR staff continued to participate in the following workgroups: Climate Action Team (CAT) Biodiversity Working Group; California Landscape Conservation Cooperative (CA-LCC); Baylands Ecosystem Habitat Goals Technical Update Steering Committee; Bay Area Ecosystem Climate Change Consortium; Capital Region Climate Readiness Collaborative; California Water-Energy Coalition (CalWEC); and Tulare Basin Watershed Connections Workgroup.

Staff served multiple roles with the CA-LCC, including being Vice-Chair of the Steering Committee, Chair of the Tribal and TEK (Tribal Ecological Knowledge) Team, and members on the Science Management and Communication Teams. The CA-LCC already completed in 2013 a charter, a Five-Year Strategic Plan, a Science Management Framework, and a Communication Framework to guide its activities. Projects supported by the CA-LCC were highlighted in the 2013 and 2014 Estuary News. With increased interest in tribal coordination, DWR staff initiated and organized in 2014 the CA-LCC's first TEK workshop in Sacramento to educate state and federal

scientists on the role of TEK in integrating with western science. DWR's tribal coordinator assisted with the contacts and facilitated the workshop.

Staff also assisted non-DWR Project WET (Water Education for Teachers) by participating in teacher workshops and providing relevant presentations to facilitate the development of water resources and climate change curriculum. Staff continued to support the CoCoRaHS (Community Collaborative Rain, Hail, and Snow Network) non-profit group as part of DWR's Climate Change Program "Citizen Science" outreach initiative. Staff offered support to local Resource Conservation Districts and provided presentations for local volunteer weather monitoring programs.

In line with expanding the Climate Change Program's involvement with Project WET, staff initiated two DWR climate change pilot workshops in Oroville and Visalia in coordination with DWR's Office of Public Affairs and the Water Education Foundation's Project WET Coordinator for California. Staff integrated presentations on climate and water, climate change indicators and trends, greenhouse gas emissions, CoCoRaHS, and mitigation and adaptation strategies with Project WET school activities. An evaluation report on the pilot workshops was completed by the Project WET Coordinator, along with recommendations for future classes.

In addition, regional staff has been participating in Basin Studies funded by the U.S. Bureau of Reclamation (USBR). Staff has been involved with the Stakeholders Technical Advisory Committee for the Los Angeles Stormwater Conservation Study being co-led by Los Angeles County Flood Control District (LACFCD) and USBR. Responsibilities include reviewing and providing input on draft scopes of work and reports. This study included downscaling climate change and hydrologic modeling. Completed already for this basin study are the following products: Development of Climate-Adjusted Hydrologic Model Inputs; Hydrologic Modeling Report; Infrastructure & Operations Concepts; Water Supply & Water Demand Projections; and Existing Infrastructure Response and Operations Guidelines Analysis Report.

Also, as cost-share partners, regional staff is working collaboratively with the USBR and the State of Oregon's Water Resources Department to perform the Klamath Basin Study. Staff is involved with the Technical Working Group of that Klamath Basin Study, which is a comprehensive assessment to define current and future imbalances in water supply and demand, to evaluate the effects of climate change on water supply and demand, and to develop and analyze adaptation and mitigation strategies to resolve imbalances in the Klamath Basin. In 2014, draft reports for the Klamath Basin Study were developed. Staff also participated in assessing potential climate adaptation strategies for the USBR Truckee River Basin Study.

The year 2014 also marks the beginning of regional staff involvement with the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP). Regional staff is working with the CA Ocean Science Trust (OST) and Scripps Institution of Oceanography (SIO) on a National Oceanic and Atmospheric Administration (NOAA) grant-funded project, whereby DWR is providing matching funds through in-kind services and monetary support. Staff has solicited involvement from DWR's FloodSAFE program to increase integration with DWR's responsibilities under NFIP. The pilot project (*Piloting Non-Stationary Approaches to Floodplain Management: Supporting Local Communities and Informing National Policy*) focuses on understanding local sea level rise in context of other coastal processes to provide the science background in supporting adaptation strategies for the coastal regions. The project is developing partnerships between scientists and decision makers in coastal protection, supporting the goals of the NOAA Climate and Societal Interactions Program, advancing capacity of decision makers at multiple levels to prepare for and respond to the impacts of climate variability and change on coastal communities, and informing coastal floodplain management specifically in compliance with the NFIP. Regional staff organized and led a scoping meeting with OST in May, a background informational webinar for the Focus Group in September, and the first Focus Group meeting in October. This meeting was followed by a technical webinar hosted by FEMA for SIO and other participants. A poster on the project was developed by the planning team that regional staff leads and that includes staff from FloodSAFE and OST. This poster was presented at the September Floodplain Managers' Association and at the October DWR Environmental Scientist Annual Workshop. Regional staff further presented on climate change, flooding, and this project at DWR's December class to floodplain managers on the NFIP in Oceanside. One of the products for this project will be a coastal appendix to DWR's Quick Guide to the NFIP.

Project Deliverables for 2015:

- Baylands Ecosystem Habitat Goals Technical Update – final report, summer
- CA-LCC product: Climate Summit (October); Tribal Climate Adaptation Training (Fall)
- 4 Project WET workshops sponsored by DWR's Climate Change Program (April, June, September)
- LACFCD/USBR Basin Study products: Stormwater Capture Opportunities and Options List; Technical Analysis Criteria; Economic Analysis; Environmental and Social Effects; Trade-Off Analysis; Trade-Off Analysis & Recommendations Interim Report
- Klamath Basin Study product: a series of nine final technical reports and a final report
- Truckee River Basin Study final report
- NOAA Grant products: Needs Assessment; Coastal Appendix to Quick Guide; Comprehensive Report; Technical Methods Manual, presentations at FMA Conference (September)

Customers:

Federal, state and local agencies, water and electrical providers, teachers, non-profit entities, and DWR climate change program

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

California-Netherlands Water Resources Cooperation and Exchange

Sponsor/Program Manager	John Andrew
Project Manager	Andrew Schwarz

Project Objective:

DWR has formed a cooperative partnership with the Rijkswaterstaat in the Netherlands to exchange information and expertise about topics of common interest.

Project Description:

In March 2011, a delegation from the Dutch Rijkswaterstaat visited California for a series of discussions and tours of California water facilities. In February 2012, a Letter of Intent was signed between DWR and the Rijkswaterstaat to continue cooperation and information exchange in the areas of integrated water management, operational water management, and policy planning on water management with special consideration to the impacts of climate change on those aspects of water management.

Project Accomplishments for 2014:

In 2014, DWR staff had a series of conversations and webinar presentations with Rijkswaterstaat staff to exchange information, learn more about each other's water resources management practices and identify specific areas of interest where continued collaboration and information exchange would be beneficial to both partners. Information exchange included a webinar series with presentations from Climate Change staff on Climate Change Scenario Selection, Climate Change Vulnerability Assessment and Adaptation Plan, and SWP Water Supply Delivery Reliability. Rijkswaterstaat presented on their Delta Program, Delta Model, and Future of Weather.
In December DWR Public Affairs made a presentation on Drought Communication. Presentation was well received; some of the material presented by DWR staff on Drought Communication was later incorporated into an updated dry season public notification prepared by Rijkswaterstaat.

From the information exchange webinar's water supply delivery reliability was identified as the preferred topic for developing a joint project. Communication of climate change and drought impacts was identified as a topic for additional information exchange.

Funding Information:

Project Budget:	0	**Funding Source:**	

Project Start Date:	2012	**Project End Date:**	DATE IN PROGRESS N/A X

External Partners:

Rijkswaterstaat of The Netherlands

Customers:

OPERATIONS

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Evaluation of Benefits of Reoperation of Water Supply and Flood Protection Systems

Sponsor/Program Manager	Kamyar Guivetchi
Project Manager	Sean Sou

Project Objective:

Improve water supply reliability and flood protection, and ecosystem restoration and protection

Project Description:

The California Department of Water Resources (DWR) is conducting a system reoperation study (SRS) in cooperation with other State and federal agencies, local water districts, groundwater managers, and other stakeholders, to identify potential strategies for reoperation of the statewide flood protection and water supply systems. The opportunity to reoperate portions of California's statewide water system to yield increased water resources-related benefits was recognized by the State Legislature in Senate Bill X2 1 (SB X2 1) (Perata, 2008 – Water Code Section 83002.5).

In support of the legislative objectives, DWR developed the SRS to identify viable reoperation strategies and understand how integrated management can:

- Improve the reliability of municipal and irrigation water supply
- Reduce flood hazards
- Restore and protect ecosystem function and habitat conditions
- Buffer the hydrologic variations expected from climate change
- Improve water quality

Development of the SRS is a multi-phased effort that includes:

- Phase 1 – Plan of Study – Completed 2011
- Phase 2 – Strategy Formulation and Refinement - Completed 2013
- Phase 3 – Preliminary Assessments of Strategies – Planned to be completed in 2015
- Phase 4 – Reconnaissance Level Assessments of Strategies – Planned to be completed in 2017

The system reoperation strategies will be analyzed with appropriate climate change scenarios and evaluated for their ability to reduce or minimize climate change impacts to water supply, flood management, and the ecosystem. System reoperation which involves primarily the use existing storage infrastructure and conveyance systems, such as conjunctive use of surface water and groundwater, could help reduce climate change impacts including reduced snowpack, more precipitation in the form of rain, and early snow melt.

Funding Information:

Project Budget:	$10,000,000	**Funding Source:**	Prop. 84

Project Start Date:	2010	**Project End Date:**	Fall 2017

External Partners:

N/A

Project Accomplishments for 2014:

No Update for 2014

Project Deliverables/Timeline:

Phase 3 Report: Preliminary Assessments of Strategies – Planned to be completed in 2015

Phase 4 – Reconnaissance Level Assessments of Strategies – Planned to be completed in 2017

Customers:

General Public, California Legislators, Water management facilities owners and operators

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Impacts on California Water Rights Study

Sponsor/Program Manager	John Andrew
Project Manager	Andrew Schwarz

Project Objective:

Evaluate the potential impact of climate change on existing water rights in California

Project Description:

This project will look at how changing streamflow as a result of climate change could potentially impact the ability of water rights holders to exercise their water rights. As the amount and timing of surface water flows change the ability of water rights holders to divert water as they have in the past is expected to change. This study will attempt to quantify those changes and discuss the potential impacts to water users and other sources of water if such changes occur.

Funding Information:

Project Budget:	$50,000	**Funding Source:**	N/A

Project Start Date:	2013	**Project End Date:**	DATE: IN PROGRESS: N/A X

External Partners:

None

Project Accomplishments for 2014:

In 2014, analysis and modeling was completed for climate change impacts on the invocation of Term 91 water diversion curtailments. Also during 2014, a draft paper was developed and circulated for review to multiple legal, water operations, and water rights administration experts. Comments were received and the paper was modified in response to the comments. The paper was submitted to the Journal of San Francisco Estuary and Watershed Science on July 23rd and is still being reviewed by the Journal and a decision on publication has not yet been reached.

Project Deliverables/Timeline:

Completion of Draft Paper for review 5/2014. Publication of final paper by 12/2014

Customers:

California water policy makers and water rights holders. State Water Resources Control Board.

ENERGY & GREENHOUSE GAS EMISSIONS

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Integrated Resource Plan for the State Water Project

Sponsor/Program Manager	William Forsythe
Project Manager	Veronica Hicks

Project Objective:

A 20 year resourcing plan (updated every 3 years) under which the long-term energy needs of the State Water Project's (SWP) would be met.

Project Description:

The Integrated Resource Plan (IRP) is a resourcing plan outlining strategies under which the long-term energy needs of the State Water Project's (SWP) would be met. The IRP considers a balanced approach to meeting the operational, economic, and policy needs of the SWP's water delivery requirements. One component of the IRP is a renewable resources procurement plan that will keep SWP operations consistent with the GHG reduction goals outlined is DWR's Climate Action Plan which incorporates the Governor's Executive Order S-03-05 and AB 32. In developing the IRP, DWR considers numerous operational and regulatory constraints and objectives the SWP is committed to meeting: • Reliable water deliveries; • Affordable and sustainable water deliveries; • Protection of the natural environment; • Responsibilities under regulatory authorities; and • State and federal environmental policy goals.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	2006	**Project End Date:**	DATE: X IN PROGRESS: N/A:

External Partners:

State Water Contractors

Project Accomplishments for 2014:

No Update for 2014

Project Deliverables/Timeline:

Triennial update to the IRP and renewables procurement plan will be completed in Summer 2013.
Enter into a contract for renewable resources under the 2012 renewable request for proposal (RFP), Spring 2013.
Long-term power purchase agreement for energy from RG Unit No. 4 will terminate in Summer 2013.
Completed the standard block purchases recommended as part of IRP09 by Summer 2013.
Complete the power planning portion of the Edmonston value engineering study following O&M's efficiency tests (by Spring 2014.
Complete initial studies of additional small hydro power plants at or adjacent to SWP facilities in 2014.

Customers:

State Water Contractors

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Monitoring and Tracking of Implementation of DWR Greenhouse Gas Emissions Reduction Plan

Sponsor/Program Manager	Andrew Schwarz, Katy Spanos, Heidi Rooks
Project Manager	Andrew Schwarz

Project Objective:

Monitor and track implementation of DWR Greenhouse Gas Emissions Reduction Plan to meet the commitments laid out in the Plan and ensure that DWR is on course to meet its GHG emissions reduction goals.

Project Description:

With the adoption of the DWR Greenhouse Gas Emissions Reduction Plan (GGERP) on May 24th, 2012 DWR committed to substantial GHG emissions reduction goals (Near-term: Reduce GHG emissions to 50% below 1990 levels by 2020; Long-term: Reduce GHG emissions to 80% below 1990 levels by 2050). DWR also committed to annual tracking and reporting of GHG emissions and a quinquennial review of progress toward achievement of goals and re-evaluation of GHG emissions reduction strategies if necessary.

Funding Information:

Project Budget:	$50,000	**Funding Source:**	N/A

Project Start Date:	2012	**Project End Date:**	DATE IN PROGRESS N/A On-going through 2050

External Partners:

The Climate Registry

Project Accomplishments for 2014:

A general protocol and procedures have been developed for tracking and reporting annual emissions. In 2014, DWR completed extensive negotiations with The Climate Registry State and DWR's 3rd Party Verifier (Ruby Canyon) to gain approval to modify the way DWR reports its emissions to TCR. This modification brings DWR's TCR emissions reporting in line with the methodology for emissions accounting detailed in the GGERP and provides a true accounting of DWR's annual GHG emissions. Because of this revision in methodology, during 2014 DWR went back and revised its GHG emissions reports for 2010 and 2011 to be consistent with the new methodology. 2010 and 2011 revised emissions reports were verified and accepted by TCR in 2014. During 2015, DWR will work with Ruby Canyon to finalize and verify emissions reports for 2012, 2013, and 2014 and will bring all emissions accounting reports up to current. All accepted emissions reports and draft emissions reports along with several summary documents and graphics showing DWR progress toward achievement of its GGERP are documented and are posted on the DWR Climate Change webpage (http://water.ca.gov/climatechange/CAP.cfm).

Project Deliverables/Timeline:

On-going monitoring and reporting of DWR GHG emissions consistent with the GGERP each year, Quinquennial evaluation of progress toward meeting GGERP GHG emissions reduction goals.

Customers:

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

2013 Emissions Reports to the California Air Resources Board (CARB)

Sponsor/Program Manager	Veronica Hicks
Project Manager	Ram Verma/Veronica Hicks

Project Objective:

Reporting and verification of 2013 Greenhouse Gas (GHG) emissions.

Project Description:

In May 2014, DWR reported its GHG emissions to the CARB for the emission year 2013. The report included energy generated and consumed by the SWP, GHG emissions due to energy imported from RG4, and SF6 emissions associated with the SWP's switchyard circuit breakers. To meet its compliance obligation for the Cap and Trade program, DWR participated in GHG allowance auctions conducted by CARB.

Funding Information:

Project Budget:	$	**Funding Source:**	

Project Start Date:	01/02/14	**Project End Date:**	DATE 12/31/14

External Partners:

California Air Resources Board

Project Accomplishments for 2014:

In 2014, DWR reported its 2013 GHG emissions to CARB. The reported emissions were verified by a third party verifier. DWR purchased compliance instruments to meet its compliance obligation for the Cap and Trade Program.

Project Deliverables/Timeline: What are the current or future objectives of the project? Create a list of tangible products that have/will result(ed) from project.

Current Objectives:

1. Compliance with mandatory reporting requirements of AB32
2. Monitoring of emissions and quantities of SF6 and fuels
3. Third party verification of the reported emissions
4. Compliance with CARB's Cap and Trade program

Future Objectives:

1. Compliance with CARB's Cap and Trade program

2. Tracking and reducing GHG emissions

Tangible results that will result from the project:

1. Compliance with AB32 regulation
2. Compliance with CARB's Cap and Trade Program
3. Optimized compliance cost
4. Reduced GHG emission
5. Optimized fuel usage
6. Availability of emission reports

Customers:

Public, CARB and State Water Contractors

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Mitigation Team

Sponsor/Program Manager	John Andrew, Elissa Lynn
Project Manager	Qinqin Liu

Project Objective:

GHG emission reduction in water resource management and planning to implement AB 32 Scoping Plan for climate change mitigation

Project Description:

DWR major actions for GHG emission reduction related to water- energy efficiency for water resource management and planning include 1) developing white paper and conceptual framework to connect climate change with water, energy, and food in ecosystem for GHG reduction, developing water- energy reference and climate science documents related to California Water Plan Update; 2) providing outreach for agriculture water use efficiency, 3) contributing to WETCAT Climate Action Team management actions and coordinating with the WETCAT agencies for AB 32 Scoping Plan implementation, 4) coordinating urban and agricultural water management as well as integrated regional water management programs regarding water energy efficiency and GHG emissions reductions, 5) working with DWR carbon offset work team for GHG reduction in water sector.

Funding Information:

Project Budget:	$300,000	**Funding Source:**	AB 32

Project Start Date:	2011	**Project End Date:**	DATE / IN PROGRESS / N/A: X

External Partners:

WETCAT agencies, agriculture and urban water organizations, the public

Project Accomplishments for 2014:

I. Developed and completed water-energy framework in final CA Water Plan Update, including 1) water-energy connection (Volume 1, California Water Today); 2) estimated energy intensity required for the extraction and conveyance of water from ten hydrological regions in California (Volume 2, the Regional Reports); 3) Resource Management Strategies identifying water management actions to reduce energy consumption and associated GHGs (Volume 3, Resource Management Strategies);4) water-energy evaluation reference document.

II. Developed and released the water-energy website content to the public.

III. Coordinated with WETCAT agencies to complete AB 32 Scoping Plan update and reviewed related EIR documents, and provided leadership to complete the final State Climate Change Action Research Plan in water sector; organized and provided water-energy presentations to the WETCAT; Provided inputs and coordinated water-energy data with CPUC to develop water-energy calculator for water project energy saving and cost effective analysis.

IV. Developed the white paper outline and provide outreach and presentation at America Ecological Society Conference regarding climate change related to water, energy and food in ecosystems, and provided outreach using climate art.

V. Helped the IRWM Branch to develop Water-Energy funding PSP, participated three workshops, and completed reviews of all 96 proposals; provided guidance and designed a water-energy-GHG calculator to assist the funding program.

VI. Provided financial assistance to agricultural operations to implement water conservation measures and reduce GHG emissions, and worked with CDFA in the creation of guidelines and the implementation process for the grant program in State Water Efficiency and Enhancement Program. Updated Agricultural Water Management Plan Guidebook by Working with the Water Use Efficiency Branch to provide an updated and extended Climate Change section of the Guidebook. Participated in the Natural Resources and Agriculture Subgroup of the President's Task Force on Climate Preparedness by providing recommendations to preserve agriculture and rangelands as a mitigation and resiliency strategy.

Project Deliverables/Timeline:

DWR will complete Water-Energy white paper and related reference information by December 2015. DWR will also provide guidance on water- energy reporting in urban water management plan in 2015.

Customers:

WETCAT agencies, agriculture and urban water organizations, the public.

BUSINESS PRACTICES & TECHNICAL EXPERTISE

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

DWR Climate Change Program

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn/Michael Healey

Project Objective:

The Climate Change Program supports all climate change activities across the Department. Specialists in both adaptation and mitigation are located throughout the regional offices, and headquarters. Program goals include providing regionally-specific climate change information to programs, projects, and documents, by accessing and synthesizing research, data, tools, and topical content for California's unique water management issues with regard to a warming climate.

Project Description:

DWR has had a climate change program since 2009. Executive Manager for Climate Change, John Andrew, hired a multidisciplinary team of climate change specialists to serve the Department and public on issues related to climate change and water management. Members are matrixed across and the Statewide Integrated Water Management and Integrated Regional Water Management Divisions. In 2014, the program hired an Engineer, Water Resources. The Climate Change program receives funding from Proposition 84, and fees from the Air Resources Board under Assembly Bill 32 (Global Warming Solutions Act). Eight and a half full-time staff are supported by Prop 84, with two supported by AB32. Additional climate change support is provided by Executive, and Water Use Efficiency.

Funding Information:

Project Budget:	$2.5 -4 M/year	**Funding Sources:**	Proposition 84 and AB 32

Project Start Date:	2009	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

Matrix managed across multiple divisions of DWR; see inserted program "org" chart below.

Project Accomplishments for 2014

Climate Change Program staff conducted or supported most of the projects listed in this Annual Report. In addition, the program held four Climate Change Matrix Team meetings in 2014, for internal DWR coordination on projects and topics related to climate change and water management. Climate Change staff met regularly to address adaptation and mitigation issues in the following subgroups; Mitigation, Water-Energy, Tribal- Climate Change, Outreach Data, Climate Art, and the CAP Phase III (DWR Vulnerability Assessment), plus held bi-weekly full team meetings. Program staff continued work on a 5-year strategic plan, tying individual work plans to program objectives.

Project Deliverables/Timeline:

The program has funding that should support all activities of the climate change program through FY 15/16.

Customers:

California Water Plan, Integrated Regional Water Management, and FloodSAFE programs. The program also provides support to the WETCAT, the Governor's Climate Action Team and the Governor's Water Action Plan

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Matrix Team

Sponsor/Program Manager	Gary Bardini
Project Manager	John Andrew

Project Objective:

Communication and coordination of climate change activities across DWR

Project Description:

DWR's Climate Change Matrix Team includes representatives from every division and major program in the Department. The team of approximately 40 staff (membership is on the last page of the annual report) meets quarterly to communicate and coordinate on climate change issues. Meetings regularly feature an external speaker on climate change, Department and State policy discussion, and an update from the State Climatologist.

Funding Information:

Project Budget:	$40,000	**Funding Source:**	Various

Project Start Date:	March 2007	**Project End Date:**	Ongoing

External Partners:

None

Project Accomplishments for 2014:

The matrix team received presentations on forestry (from CalFire), climate change governance (from the Little Hoover Commission) and paleohydrology (from the University of Arizona).

Project Deliverables/Timeline:

Quarterly meetings

Customers:

DWR management and staff

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Development of Internal DWR Policies on Climate Change Mitigation, Analysis, and Adaptation

Sponsor/Program Manager	Andrew Schwarz, Katy Spanos, Heidi Rooks
Project Manager	Phase I: Andrew Schwarz, Phase II: Andrew Schwarz and Erin Chappell, Phase III: Andrew Schwarz and Michelle Selmon

Project Objective:

Develop comprehensive DWR policies and procedures to guide climate change mitigation, analysis, and adaptation on activities performed by DWR.

Project Description:

In June 2009, the Director formally established the CEQA Climate Change Committee ("C4") to review all climate change analyses in DWR environmental documents and exemption considerations prior to publication. Since that time C4 has served as the key advisory board for all elements of climate change analysis in CEQA documents. Since 2008, C4 has reviewed and commented on tens of environmental impact reports and nearly 100 other Departmental environmental documents.

Over the past 5 years, C4's recommendations and approach to addressing climate change issues in CEQA documents has evolved and matured as new legislation and litigation has provided additional requirements, information, and context. In 2010, C4 began a three phase process to develop a comprehensive DWR Climate Action Plan which will contain internal policies to address climate change mitigation, effects analysis, and adaptation. **DWR staff, located in the four regional offices and headquarters, will continue to provide technical assistance to project managers and consultants throughout the department to implement policies and guidance developed by the C4.**

Phase I of the Climate Action Plan is a comprehensive DWR-wide Greenhouse Gas Emissions Reduction Plan that documents 1) DWR's actions to reduce GHG emissions from its activities consistent with AB 32 and Executive Order S-3-05 and 2) Complies with the requirements of CEQA Guidelines section 15183.5 for "Plans for the reduction of greenhouse gas emissions" that can be relied on in subsequent project specific analysis.

Phase II of the Climate Action Plan will be a guidance framework and data toolbox to guide incorporation of climate change in future planning analysis of DWR projects and activities. Completion of Phase II will result in a guidance document and an accompanying climate scenario toolbox to assist DWR project managers with assessing the need for climate change analysis in their planning activities and guiding decision making for selection of analytical tools and analysis procedures, as well as, assumptions about future conditions. The guidance framework will ensure that DWR projects meet standards for consistency, quality, and adequacy in climate change analysis. This phase of the Climate Action Plan builds on the December 2010 publication of "Climate Change Characterization and Analysis in DWR Planning Studies" by Abdul Khan and Andrew Schwarz. This foundational document is a comprehensive and comparative review of planning studies conducted by DWR and its partner agencies that have addressed climate change.

Phase III of the Climate Action Plan will be a DWR Climate Change Resiliency and Adaptation Plan. This plan will review DWR owned and operated facilities and DWR's activities throughout the state, conduct a vulnerability analysis of these facilities and activities and develop resiliency and adaptation strategies for the department to prepare and protect DWR's assets and services from expected change in climate.

Funding Information:

Project Budget:	$300,000	**Funding Source:**	N/A

Project Start Date:	2009	**Project End Date:**	DATE: X IN PROGRESS: N/A:

External Partners:

Phase I: California Attorney General's Office, OPR. Phase II: DWR Climate Change Technical Advisory Committee
Phase III: TBD

Project Accomplishments for 2014:

Phase I: Completion of DWR GHG Emissions Reduction Plan (GGERP) March 2012, Completion of CEQA review May 2012, formal adoption of GGERP by DWR Director Cowin May 24, 2012. Full implementation of GGERP began June 1st, 2012. **Phase II:** Continued work with CCTAG to evaluate climate change scenarios and analysis methods. Staff have developed a scenario selection roadmap and screening procedure with the CCTAG and hold monthly working group sessions with the CCTAG Scenarios Subgroup. Work is also continuing on a data toolbox that will include historical climate change analysis data as well as newly developed tools and data. All historical data has been compiled and metadata is being developed for these climate change scenarios.
Phase III: An interdisciplinary team has been assembled to develop the Vulnerability Assessment for DWR facilities and activities, analyses have already been conducted and are complete for wildfire and extreme heat impacts. Additional analysis on hydrologic impacts and impacts on ecosystem services are continuing. The interdisciplinary VA/AP team meets each week to collaborate on progress and discuss data, tools and analytical approaches.

Project Deliverables/Timeline:

Three Phase Climate Action Plan: Phase I completion in 2012, Phase II completion in 2016, Phase III completion 2016.

Customers:

DWR project managers

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Sustainability

Sponsor/Program Manager	Dale Hoffman-Floerke /Laura King Moon
Project Manager	Mary Simmerer

Project Objective:

DWR will be a sustainability leader within State government and the California water community

Project Description:

DWR has established a Sustainability Policy, which received approval from former DWR Director Snow, on April, 22, 2009. DWR's Sustainability Policy embodies the goals and directions the Department will take to be a sustainability leader within State government and the California water community. The policy sets initial targets in the following areas:

- Carbon- 50% reduction below 1990 levels by 2020 (consistent with the AB 32 Scoping Plan); 80% reduction below 1990 levels by 2050 (EO S-0-05)
- Energy- Progressive acquisition of 360 GWh of renewable energy resources by 2020; reduce grid-based retail energy demand 20% by 2015; ensure Energy Star purchasing (EO S-2-04)
- Wastewater- Incorporate recycled wastewater and/or greywater into facilities if technically feasible and cost-effective
- Waste- 50% diversion form waste stream by 2020 (AB 1016)
- Water- 20% reduction in per employee water use by 2020 (consistent with SB 7x-7)

Funding Information:

Project Budget:		**Funding Source:**	N/A

Project Start Date:	April 22, 2009	**Project End Date:**	DATE IN PROGRESS N/A X

External Partners:

None

Project Accomplishments for 2014:

No Update for 2014

Project Deliverables/Timeline:

- Carbon- 50% reduction below 1990 levels by 2020 (consistent with the AB 32 Scoping Plan); 80% reduction below 1990 levels by 2050 (EO S-0-05)
- Energy- Progressive acquisition of 360 GWh of renewable energy resources by 2020; reduce grid-based retail energy demand 20% by 2015; ensure Energy Star purchasing (EO S-2-04)
- Wastewater- Incorporate recycled wastewater and/or greywater into facilities if technically feasible and cost-effective
- Waste- 50% diversion form waste stream by 2020 (AB 1016)
- Water- 20% reduction in per employee water use by 2020 (consistent with SB 7x-7)

Customers:

DWR

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Sustainable Facilities Operations - Greenhouse Gas (GHG) Initiatives

Sponsor/Program Manager	Executive
Project Manager	John Engstrom

Project Objective:

Reduce GHG attributed to Business Operations

Project Description:

DWR will identify, measure, and implement sustainable facility operation practices to reduce GHG, and educate employees in these practices. The sustainable facilities operations practices to make DWR "greener" will include reducing energy and resource consumption, while lowering greenhouse gas emissions and creating healthier working environments for DWR employees. The development of these enhanced business practices will include:

- DWR has integrated a document management system into its daily business operations. This type of system will reduce paper quantity and create an electronic system for tracking of approvals and electronic retention of documents to save time and resources.
- DWR will continue to promote the Environmentally Preferable Purchasing (EPP) program to utilize procurement methods that provide options for purchasing "green" products.
- DWR will increase its efforts to reduce, reuse, recycle, and rethink in all areas of DWR's daily business activities. DWR will look at continuing to increase its waste reporting metrics under SB 1016 by using annual waste disposal as a factor when evaluating program implementation.
- DWR will continue to provide an official office supply reuse center (Green Pastures) on the 3rd floor of the Resources Building for new, gently used, or open box office materials that are available to all DWR employees free of charge.
- DWR will promote and implement energy, water efficiency, and conservation in all capital and renovation projects as well as operations and maintenance activities within budgetary constraints and programmatic requirements.
- DWR will promote ways to reduce employee business travel for meetings by use of technology such as teleconference centers or web casting. In addition, training webinars and other online training opportunities will be investigated to reduce training commute for employees.
- DWR will continue to promote the Payroll Deduction Transit Pass Program as part of its alternative commute program which subsidizes alternative transportation.

Other actions in progress or in planning to promote a more sustainable business include:

- DWR will continue to educate through outreach activities like the annual Green Week event, *DWR News/People* articles and *Current* announcements.
- DWR is participating in the green building certification program LEED (Leadership in Energy and Environmental Design). The State Water Project Southern Field Headquarters is currently being submitted to LEED to become DWR's first LEED Gold building.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	Continuous Efforts	**Project End Date:**	DATE / IN PROGRESS / N/A X

External Partners:

Department of General Services

Project Accomplishments for 2014:

- DWR actively promotes commuting by bicycle. One of the efforts to increase this alternative mode of transportation is to encourage DWR staff to participate in the Sacramento's regional "May is Bike Month". DWR employees logged 34,709 miles for the month of May in 2014.
- DWR participated in Executive Order (EO) B-18-12, Green Building Initiative. DWR is monitoring retail water accounts and recorded Energy Star Portfolio Manager. All State Agencies are required to reduce water use 10% by year 2015, and 20% by year 2020. DWR reduced its water consumption by 36%.
- DWR's Purchasing Services Office will provide purchasing workshops to update the department buyers about the Environmentally Preferable Purchasing Practices (EPP) program and why it is in the best interest for the Department to utilize this opportunity. The purchases are reportable in many cases under the mandated goals outlined in the Public Contract Code (PCC) (12153-12320) for buying recycled-content products (RCPs). The goal of this effort is to increase purchases of RCP's.
- DWR News/People- DWR has promoted sustainability through quarterly "DWR News/People" publication. The articles discuss accomplishments by DWR staff related sustainability at DWR.
- Green Award for Reduction of Waste Disposal- A DWR sustainability award was created to promote waste reduction and recycling within our Department. The recipient of this Diversion Award disposed the least amount of waste from 18 primary categories and six hazardous waste material categories. Delta Field Division is the most recent winner of this award.
- DWR continues to install VDI (Virtual Desktop Infrastructure) Zero Client. This desktop-centric service has helped the department reduce energy usage by virtualizing all the components of the desktop.
- DWR currently has (1) zero emission- dedicated electric vehicle and (16) non plug in hybrid vehicles. The Department is showing its commitment to sustainability by purchasing (6) additional zero emission-dedicated electric vehicle and (10) non plug in hybrid vehicles for 2014/2015.

Project Deliverables/Timeline:

Continuing GHG Reduction Measures

Customers:

DWR, and State Water Contractors

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Environmental Stewardship Policy

Sponsor/Program Manager	Executive
Project Manager	Ted Frink

Project Objective:

Implementation of the Environmental Stewardship Policy in DWR programs and projects

Project Description:

In October 2010 DWR's Director Mark Cowin established the inaugural Environmental Stewardship Policy. This policy is integral to advancing a Department-wide "Total Resource Management" approach to planning and design of projects. It sets forth the intent that DWR shall work towards the sustainability of public trust resources related to water resources management and the environment including strategies to address climate change impacts. The Policy states that DWR shall fully integrate environmental benefits, which include, but are not limited to, habitat protection and restoration/enhancement objectives and climate change adaptation in the planning, development, and implementation of operations, maintenance, and all projects under the authority of DWR. The Environmental Stewardship Policy commits DWR managers to consider, integrate, and design environmental stewardship attributes into DWR's water and flood management programs and projects in several ways: integrate ecosystem protection and restoration into water storage and conveyance and flood control/management planning and implementation; include environmental stewardship and ecosystem protection and restoration as criteria in project funding decisions for all DWR programs; plan for conservation, restoration and maintenance of the biological diversity and natural physical processes of aquatic and related terrestrial ecosystems; and plan and implement projects that contribute to the recovery of aquatic and riparian species listed under the federal and state Endangered Species Acts and other laws, as well as other at-risk species. In March 2012, the revised WREM 58b: Environmental Stewardship and Compliance was adopted. It provides guidance for consideration and application of Environmental Stewardship Principles along with project-level guidelines to improve DWR's ability to meet or exceed environmental compliance requirements.

Following the adoption of WREM 58b, the Environmental Stewardship Implementation Plan Work Group (ESIP) has begun development of an Environmental Stewardship Implementation Plan. The Plan will focus on developing education, outreach, and guidance on integrating Environmental Stewardship concepts and principles into all facets of DWR programs and projects. The ESIP Team has initiated the establishment of individual work teams for each of five identified areas of need for implementing the ES Policy throughout DWR programs. The five areas include Resources, Technical Assistance, Monitoring, Education and Training, and Communication and Outreach plans. The Plan will be completed in three phases. In Phase 1, initiated in 2014, the ESIP work teams will develop the scope, schedule, and budget needed to carry out the Plan. The development and implementation of the full Plan will occur in Phases 2 and 3, respectively. The outcomes of the project are expected to help advance environmental stewardship and sustainability objectives for public trust resources and the State's water management infrastructure by following the Director's Total Resource Management approach.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	November 2010	**Project End Date:**	DATE / IN PROGRESS / N/A X

External Partners:

N/A

Project Accomplishments for 2014:

Planning for the development of the Environmental Stewardship Plan began in 2014 is ongoing through 2015.

Project Deliverables/Timeline:

The ESIP workgroup has formed and Phase 1 of the Environmental Stewardship Implementation Plan will be completed by mid-2015.

Customers:

DWR managers and staff

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Provide Assistance for Water Use Efficiency

Sponsor/Program Manager	Diana Brooks
Project Managers	Kent Frame

Project Description:

The Water Use and Efficiency Branch completed or made significant progress in six projects in the year 2014 among the total 18 projects for implementation of SBX7-7 (other 12 projects were completed). They include two projects in urban water use (U1, U3), two in agricultural water use efficiency (A6, A7), and two projects in combined urban and agricultural water use efficiency (B1, B3). All of those projects aim at water conservation and water use efficiency.

U1 – Develop the best management practices in the CII water sector (CII - commercial, industrial and institutional);

U3 – **Weather normalization of urban water use (***10608.20(h)(1) and (2) in SBX 7-7)*
DWR through a public process and in consultation with CUWCC has been developing a weather normalization technical methodology and criteria for adjusting compliance daily per capita water use. DWR informs the USC of progress through quarterly meetings and through the USC weather normalization subcommittee which also meets quarterly. The methodology is expected to be completed in summer of 2015.

A6 – DWR, in consultation with the SWRCB, has been revising the requirements for AWMPs and will soon publish the final document under the title of *A Guidebook to Assist Agricultural Water Suppliers to Prepare a 2015 Agricultural Water Management Plan*. In the Guidebook the impacts of the climate change on the agricultural water use are documented in detail, and DWR requires the agricultural water suppliers to include the climate change subject in preparation of their AWMPs.

A7 – DWR developed grant/loan funding criteria to make agricultural water suppliers ineligible for state funding unless they comply with the Water Conservation Act 10608.56(b). These criteria were used in Agricultural Water Use Efficiency funding program in 2013 and will be used in the future funding programs as well.

B1 – WUE Branch has been developing a single standardized water use reporting form to meet the water use information needs. The form will be used by the urban water suppliers as well as by agricultural water suppliers for tracking their progress to reach the state water conservation targets. (ongoing)
B3 – DWR will propose new statewide targets or revise and update existing statewide targets for regional water resources management practices including but not limited to recycled water, brackish groundwater desalination and infiltration and direct use of urban stormwater runoff. The updated targets were included in the California Water Plan Update 2013 (released in 2014).

Prop 50 funding for agricultural water use efficiency - after holding three workshops and reviewing all proposals received, DWR awarded a total of $15 million grant funding to local water agencies and NGOs. Since year 2014 staff has been developing funding agreements and signing contracts.

Prop 50 funding for water desalination – During the year 2014 staff developed PSP, held three workshops, reviewed all proposals received, and finally selected the award recipients who would receive a total of $8.7 million funding.

Staff is currently developing agreements for signing contracts with those recipient agencies.

Water-Energy Fund from Cap and Trade – Staff has been working with the IRWM Branch in PSP development, holding workshops, and reviewing the proposals received. In particular, staff designed a water-energy-GHG calculator which was used in the funding process and will be used in the future funding programs.

Save Our Water campaign and other outreach workshops – In the critical drought year 2014 Staff was actively engaged in Save Our Water campaign and in other state and DWR water saving programs. Staff organized and held 11 workshops for landscape professionals (3 workshops in Spanish), plus 2 workshops for Master Gardeners, 2 workshops for Nursery workers, and 6 workshops for public arranged by Congressman Ami Bera's office.

Project Objective:

Implementation of Water Conservation Act of 2009 (SBX7-7) to achieve (1) urban water use reduction statewide by 20 percent per capita by the year 2020, (2) to help agricultural water suppliers with efficient water management practices, and (3) response to the Governor's call for Californians to reduce their water usage by 20 percent during the record-set drought years (1/17/2014).

Funding Information:

Project Budget:	$10 million in multi-years	**Funding Source:**	Prop 84

Project Start Date:	U1 – Jan. 2010 U3 – Jan. 2010 U2 – Jan, 2010 U6 – Jan. 2010 A1 – Jan. 2010 A2 – Jan. 2010 A6 – Jan. 2010 A7 – Jan. 2010 B1 – Jan. 2010 B3 – Jan 2010	**Project End Date:**	U1 – early 2013 (delayed) U2 – completed U3 – to be completed in 2015 U6 – completed A1 – completed A2 – completed A6 – Nov. 2012 (delayed) A7 – July1, 2013 (delayed) B1 – 2013 (delayed) B3 – Jan. 2011 (delayed)

External Partners:

U1: CUWCC (California Urban Water Conservation Council)
U2: an Independent Technical Panel consisting of retail water suppliers, environmental organizations, business community, wholesale water suppliers, and academia;
U6: None;
A1: AWMC, stakeholders, and academics;
A2:None;
A6: SWRCB
A7:None;
B1: California Bay Delta Authority, California Dept. of Public Health, CPUC, and SWRCB;
B3: None.

Project Accomplishments for2014:

Project Deliverables/Timeline:

See the box immediately above

Customers:

Urban water suppliers and agricultural water suppliers, eligible NGOs, universities and research institutes

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Tribal Communities Vulnerabilities/Adaptation Matrix

Sponsor/Program Manager	Elissa Lynn
Project Manager	Erin Chappell

Project Objective:

To assist tribal communities in identifying areas where they may be vulnerable to the anticipated impacts of climate change and potential strategies for reducing those vulnerabilities.

Project Description:

The matrices were based upon the original Climate Change Vulnerability Matrix for local agencies. The matrices goals was to give tribes a tool to identify climate change impacts and identify strategies to reduce those vulnerabilities; promote outreach to tribes; and educate non-tribal communities.

Funding Information:

Project Budget:		**Funding Source:**	

Project Start Date:	April 2013	**Project End Date:**	June 2014

External Partners:

California Native American Tribes

Project Accomplishments for 2014:

Project Deliverables/Timeline:

The tribal communities vulnerabilities/adaptation matrix went final on June 2014. It is posted on DWR's Climate Change webpage.

Customers:

California Native American Tribes, General Public, DWR staff

GRANTMAKING & TECHNICAL ASSISTANCE

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Integrated Regional Water Management Grant Program

Sponsor/Program Manager	Tracie Billington
Project Managers	Joe Yun and Zaffar Eusuff

Project Objective:

For Proposition 84 IRWM funding

- Sustainable water management – developing estimates for water supply yield, water savings, improved water quality, etc.
- All IRWM Plans updated to 2012 standards
- More collaborative water management
- Improved integration of projects
- IRWM Plans consider Climate Change vulnerability adaptation
- Project selection considers mitigation of greenhouse gas emissions

Project Description:

The IRWM Grant Programs provide financial assistance in a manner that:

- Results in optimal investment of state funding providing maximum benefit to the State's people and environment through improved local and regional water management
- Is transparent and provides for engagement by partner agencies, interest-based stakeholders, and the public on program development and implementation
- Is consistent with legal, legislative, and DWR policy requirements for each funding source

Funding Information:

Project Budget:	Varies annually. Total authorized funding $1.25B	**Funding Source:**	Proposition 84 and 50 (IRWM)

Project Start Date:	November 2002	**Project End Date:**	December 2020

External Partners:

The IRWM grant program is solely administered by DWR. However, in order to deliver the program we work with a variety of state agencies along with 48 Regional Water Management Groups (RWMGs) supporting individual IRWM regions which includes a variety of local and regional water/flood management agencies, land use agencies, state and federal agencies, non-governmental organizations, and tribal entities.

Project Accomplishments for 2014:

- 42 IRWM Plans were reviewed and found consistent with current IRWM Plan Standards. The Plan Review Process remains active awaiting submittal of any additional plans in 2015.
- Final Award for the Proposition 84 2014 Drought Grant Solicitation.
  - 27 proposals were awarded a total grant funding of $221 million to support implementation of 136 projects with total project cost in excess of $782 million. DWR received 39 proposals requesting a total of $339 million in funding.

Project Deliverables/Timeline:

Current program schedule: http://www.water.ca.gov/irwm/grants/upcomingevents.cfm

Customers:

48 RWMGs supporting individual IRWM regions which includes a variety of local and regional water/flood management agencies, land use agencies, state and federal agencies, non-governmental organizations, and tribal entities.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Water-Energy Subgroup of the Governor's Climate Action Team ("WETCAT")

Sponsor/Program Manager	John Andrew
Project Managers	Qinqin Liu

Project Objective:

Coordinate state-level water-energy planning in support of AB 32.

Project Description:

DWR is a principal agency in the Water-Energy Subgroup—known as the "WETCAT"—of the Governor's Climate Action Team. DWR coordinated Water-Energy policy and management actions with other principal WETCAT agencies including State Water Resources Control Board, California Energy Commission, and the California Public Utilities Commission. The WETCAT coordinates and focuses its efforts on GHG emission reduction actions related to the transport, treatment, delivery and use of water for environmental, agricultural, residential, commercial, institutional, and industrial needs. DWR has worked with other principal WETCAT agencies to complete final AB 32 Scoping Plan update to address water and energy efficiency issues. DWR continues to play lead roles using integrated water management for water conservation, and water and energy use efficiency as well as water recycling.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	November 2006	**Project End Date:**	DATE: X IN PROGRESS: N/A:	

External Partners:

State Water Resources Control Board, California Energy Commission, the California Public Utilities Commission, Other State agencies.

Project Accomplishments for 2014:

DWR continued to be a key player and coordinated with other WETCAT principal agencies to share water-energy data and information; DWR developed and completed water-energy framework in final CA Water Plan Update and organized meetings, provided inputs, and coordinated water-energy data sharing with CPUC to develop water-energy calculator for energy saving and cost effective analysis. As a key WETCAT agency, DWR provided strategies, priority lists, review recommendations, and the contents to address water conservation, and water and energy use efficiency to complete final AB 32 Scoping Plan update and final CAT research plan; DWR organized and prepared water-energy presentations to the WETCAT.

DWR continued to lead the implementation of the "20x2020" program to reduce per capita urban water use by 20% by year 2020. DWR provided a lead role for policy and legal actions regarding water- energy reporting in urban water management plan as well as the implementation of Water Use Reduction Guidelines for State Agency Facility Pursuant to Executive Order B-18-12.

DWR provided financial assistance to agricultural operations to implement water conservation measures and reduce GHG emissions, and worked with CDFA in the creation of guidelines and the implementation process for the grant program in State Water Efficiency and Enhancement Program. DWR provided an updated and extended Climate Change section of Agricultural Water Management Plan Guidebook, and participated in the Natural Resources and Agriculture Subgroup of the President's Task Force on Climate Preparedness by providing recommendations to preserve agriculture and rangelands as a mitigation and resiliency strategy.

Other DWR project accomplishments include: 1) developed Water-Energy funding PSP, completed reviews of all 96 proposals, and provided guidance and designed a water-energy-GHG calculator to assist the funding program.

Project Deliverables/Timeline:

DWR will complete Water-Energy white paper and related reference information by December 2015. DWR will also provide guidance on water- energy reporting in urban water management plan in 2015.

Customers:

DWR, CEC, CPUC, SWRCB, CARB

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Technical Assistance and Outreach for Integrated Regional Water Management (IRWM) Plans, Data Collection, and Other Climate-Related Tasks

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn

Project Objective:

To provide resources, technical assistance, and outreach within DWR and to IRWM planning groups, water agencies, local governments, and other entities to incorporate climate change mitigation and adaptation into their planning efforts

Project Description:

This project involves developing and identifying climate change resources, working on data collection and consolidation, and providing technical assistance and outreach within DWR and to IRWM planning groups, water agencies, local governments, and other entities to mitigate for and adapt to climate change. After the passage of Proposition 84, Water Code Section 10541 was updated to define the elements of guidelines developed for approving and distributing the funds. These elements included requiring IRWM plans to consider greenhouse gas (GHG) emissions of identified programs and projects and to evaluate the adaptability to climate change of water management systems in the region. As a result, DWR 2010 and 2012 guidelines for these Proposition 84 funds required IRWM Plans to address both adaptation to the effects of climate change and mitigation of GHG emissions. Although IRWM has been the initial focus of this project, the technical assistance, data collection, and outreach has expanded to target beyond those already associated with an established Regional Water Management Group (RWMG) working in IRWM.

Funding Information:

Project Budget:	$400,000/year	**Funding Source:**	Prop 84

Project Start Date:	January, 2010	**Project End Date:**	In progress

External Partners:

N/A

Project Accomplishments for 2013 & 2014:

This task was not fully reported in 2013, so accomplishments currently cover years 2013 & 2014. Much of the work in this task was done by regional staff, though coordination with headquarters staff occurred. Assistance throughout the two years included distributing information at numerous local IRWM stakeholder meetings, as well as presenting at the 2013 IRWM Conference in Sacramento in April, 2013. A poster on IRWM solutions on climate change and San Francisco Bay Area water supplies was developed and presented by regional staff in October 2013 at the State of

the Estuary Conference in Oakland. Also in October 2013 and January 2014, staff presentations on the Safeguarding CA Plan occurred at regional workshops in Truckee, Merced, Los Angeles, Sacramento, and Klamath. Other IRWM speaking venues included the Mojave Water Agency's dedication program in Apple Valley where regional staff was invited to speak on successful integrated planning in May 2014, a public workshop on small and medium water systems in Lompoc where staff presented information on climate change impacts on water resources in June 2014, and the Inyo-Mono RWMG meeting in Bishop in October 2014.

Staff continued to participate in the Government Alliance Pillar of the Santa Ana Watershed Project Authority (SAWPA) in the update of its IRWM plan, *One Water One Watershed* (OWOW), and the development of a government resource guide, as well as to provide the pillar with a presentation by regional staff involved with the Community Collaborative Rain, Hail & Snow Network (CoCoRaHS). Staff commented on the resource guide, which was finalized in June 2013 and released that September. Staff also participated in the Santa Ana River Watershed 2013: The Power of Partnerships workshop in Costa Mesa in April by presenting three posters and materials for this SAWPA event.

Many of the RWMGs finished their climate change work in 2013 to update their IRWM plans. Regional staff in 2013 assisted and commented on the San Diego IRWM Climate Change Planning and Land Use and Water Management Studies. Regional staff also participated in the Greater Los Angeles County IRWM climate change workgroup and the Upper Santa Margarita Watershed IRWM climate change workshop. Climate change work for both the Antelope Valley and Greater Los Angeles County RWMGs was incorporated into the respective IRWM plans themselves instead of being developed into stand-alone documents. A similar approach was applied for the Upper Santa Margarita Watershed IRWM. Regional staff also assisted with the climate change components for the Upper Sacramento River IRWM in 2013 and the Yuba County IRWM in 2014. Vulnerability assessments for climate change were completed by the Bay Area, CABY (Cosumnes, American, Bear, and Yuba), Upper Sacramento River, Upper Pit River, and Greater Monterey RWMGs with input and guidance from regional staff.

Staff also provided comments on the climate change requirements and standards to DWR's IRWM Grant Program. In October 2013, regional staff identified the location and information of climate change requirements for each IRWM standard found within the 2012 guidelines for IRWM grants. Further comments were provided by staff on the standards review form used by the IRWM Program. This form was developed to evaluate during 2014 IRWM Plan compliance with the 2012 grant guidelines.

The major work during 2014 was review of the IRWM plans, appendices, and supporting documents for compliance with the climate change requirements in the Regional Management Strategies, Project Review, and Climate Change standards per the 2012 guidelines. Regional staff exchanged plans to review in order to minimize bias due to individual involvement with their respective RWMGs. A total of 40 plans were reviewed in 2014 by regional staff.

Towards the end of 2014, the Climate Change Program contracted work to the lead scientist of Inyo-Mono RWMG in evaluating the utility and use of the *Climate Change Handbook for Regional Water Planning* that was developed for use by RWMGs statewide. A questionnaire was developed and staff provided feedback and suggestions of RWMG contacts. Interviews with selected RWMGs will take place in early 2015, and a final report on the results will be developed.

The Climate Change Program also worked with staff from the CA Water Plan in surveying water, irrigation, and flood agencies on their needs for climate analyses. Regional staff obtained local contacts to beta-test the survey, which was expanded to a larger group. A summary of that survey was presented to the Climate Change Technical Advisory Group (CCTAG).

Staff experts from headquarters and the regional offices continued to update DWR's climate change website (http://www.water.ca.gov/climatechange/) with new resources and publications and to disseminate the Climate News Digest (http://www.water.ca.gov/climatechange/news.cfm), which posted its Three- and Four-Year Anniversary Issues in April 2013 and 2014, respectively. New resources added included matrices for Potential Climate Change Vulnerabilities and Adaptation Strategies for Tribal Communities, an article for Environmental Law News ("Cry Me a Reservoir: Water Management and Climate Change Adaptation"), a study on the integration of climate change into Urban Water Management Plans, an analysis of governance in flood management in the Central Valley with respect to IRWM coordination, a paleoclimate (tree-ring) study funded by the Climate Change Program, and a study that

estimated historical CA precipitation phase trends. As a result of the water-energy nexus work that headquarters and regional staff did for the CA Water Plan Update 2013, a new water-energy nexus webpage was created to highlight and share some of the work that was done (http://water.ca.gov/climatechange/water-energy.cfm).

Additional work involved outreach on the connections of climate change and water resources that occurred at workshops and conferences and with DWR staff, as well as with local, state, federal, and international entities, and included presentations in Chester, Davis, Oakland, West Sacramento, Sacramento, South Lake Tahoe, Sausalito, Los Banos, Fresno, Merced, Visalia, Los Angeles, Commerce, Diamond Bar, Long Beach, Huntington Beach, and Oceanside throughout 2013 and 2014. Regional and headquarters staff also developed a poster reflecting a timeline of DWR, state, and federal work products and observations on climate change for the DWR Environmental Scientist Annual Workshop in Loomis, September 2013. This poster has been subsequently used in other venues. Other presentations expanded to areas of sustainability and the integration of water with energy. Overall, around 53 presentations were made on the work described in this task.

Regional and headquarters staff continued to work with DWR's state climatologist on analyzing statewide precipitation data and cataloging the large amounts of climate data stored in the regional offices. Staff continued to coordinate with the retired state climatologist to apply quality assurance and quality control standards on statewide precipitation data, to integrate those data into Geographic Information Systems, and to develop mapping for multiple products. Staff continued with updating stations and verifying information for Bulletin 195. Data from verified stations will feed into databases resulting in an extreme precipitation analysis that will ultimately be available from map-based servers from DWR's Flood Emergency Response Information Service.

Project Deliverables/Timeline:

2015:

- Yuba County IRWM Vulnerability Assessment for Climate Change (Spring)
- Inyo-Mono RWMG presentation to Climate Change Technical Advisory Group (April) on results of evaluation of RWMGs use of *Climate Change Handbook for Regional Water Planning* (Spring)
- Inyo-Mono RWMG final report on results of evaluation of RWMGs use of *Climate Change Handbook for Regional Water Planning* (Spring)
- Climate Change Tools Table, IRWM Biennial Conference, San Diego (May)

Customers:

DWR, IRWM planning groups, water agencies, and local governments

CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Federal Grant Programs

Sponsor/Program Manager	Executive
Project Manager	Jeanine Jones

Project Objective:

Seek federal funding where applicable for climate-related activities, particularly research activities

Project Description:

Grant or Other Applications for Federal Funding

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	2008	**Project End Date:**	DATE: IN PROGRESS: N/A X

External Partners:

Ocean Science Trust, Scripps Institution of Oceanography, USACE

Project Accomplishments for 2014:

No Update for 2014

Project Deliverables/Timeline:

Funding decisions for the NOAA grant program would typically be made in spring 2013, but present uncertainties in the federal budget situation make it difficult to speculate when funding decisions might be announced. USACE has provided its cost-share for the follow-up NRC workshop to NRC; the workshop will be held in mid-2013.

Customers:

DFM, DWR programs interested in SLR

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

National Scientific and External Coordination Committees

Sponsor/Program Manager	Executive
Project Manager	Jeanine Jones

Project Objective:

Represent DWR at interstate, national, and international levels on climate-related matters

Project Description:

During 2012, DWR staff again engaged with interstate and national climate change efforts. Jeanine Jones served on NOAA's Climate Working Group, a subcommittee of NOAA's Science Advisory Board, and on USEPA's State and Tribal Council, a federal climate change advisory committee. She also represented the Western States Water Council (WSWC) on a technical advisory committee to the federal Climate Change and Water Working Group (a coalition of multiple federal agencies including USBR, USACE, NOAA, and USGS). She chaired the WSWC Climate Subcommittee and served on an American Meteorology Society committee on water resources applications.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:		**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

NOAA, USBR, USACE, USGS, NOAA RISAs

Project Accomplishments for 2014:

No Update for 2014

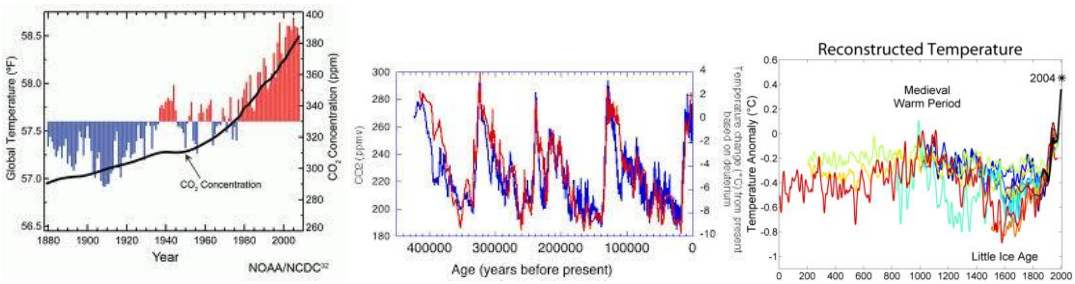
Project Deliverables/Timeline:

Continue to influence federal agency decisions regarding climate change programs, with a near-term focus on extreme events. In 2013, hold workshop on drought prediction with WSWC, and seek federal funding support for a climate analog years data project. Continue working with WSWC and WGA on congressional reauthorization of the National Integrated Drought Information System legislation, and on funding support for the NOAA Hydrometeorology Testbed program.

Customers:

Other public agencies

PUBLIC OUTREACH



DWR Climate Hawks - Outreach and Education Team
2014 Summary of Activities

Meetings

Regular meetings of the DWR Climate Change Program Outreach and Education Team were held on the 2nd Monday of each month from 1:30-3:00PM. Standing agenda items included: Updates on Recent Presentations; Subgroup Updates; Website Review; Upcoming Events of Interest; To-Do Items; and the NOAA Flood Management Grant. Other topics were added as needed, including Climate Literacy, the CA Climate Adaptation Forum, the ES Workshop, and sample outreach presentations.

Subgroup Updates

K-12 Curriculum and Slides - Connections were made with DWR's Public Affairs Office (PAO), which has been leading efforts in working with the Water Education Foundation (WEF) on Project WET on a variety of education projects for DWR. A pilot project was initiated in fall 2013 to integrate climate change into a Project WET workshop setting. This resulted in two workshops being held in spring 2014 in Oroville and Visalia that integrated Project WET activities with climate change and included information on citizen science through CoCoRaHS. The Climate Change Team, along with PAO staff and the Project WET Coordinator from WEF, conducted the workshops attended by a total of 38 educators working with K-12 students. About 9,357 students would be taught some of the principles of climate change through the workshop presentations and the Project Wet workbook activities. A final report on the workshops was provided to DWR by WEF, along with recommendations for future classes. The classes were also highlighted in the California Regional Environmental Education Community (CREEC) Network winter newsletter for Region 7, which is based in Fresno. Future classes for the coming year are being investigated.

Sea Level Rise Case Study Booklet - The concept of the booklet was presented to the CO-CAT. There was interest in the idea, but there were concerns on keeping it viable and useful, on the availability of resources in providing the information, and on who would do the work. Also, DWR CO-CAT representatives had a concern as to the extent of DWR's role in SLR work when other agencies would be more likely involved with SLR and questioned our role as lead in this effort. As a result, the CO-CAT agencies agreed to add their projects on their shared CNRA page for CC, though that seems to have been stalled. The project is currently on hold. Meanwhile, another effort has been underway by the Coastal Coalition, which has created Lifting the Fog website (http://coastaladaptation.org/LiftingTheFog/) and has begun entering CA SLR case studies on the web. Two case studies have been identified, so far.

Posters - A poster was developed to communicate the work the CC Program is doing with the CA Ocean Science Trust and Scripps Institution of Oceanography on a NOAA grant in assisting floodplain managers in addressing SLR in the context of the FEMA National Flood Insurance Program's non-regulatory approaches. This poster was presented at the annual Floodplain Management Association's annual

meeting in Santa Rosa and DWR's Environmental Scientist annual workshop in Sacramento. Other posters being considered include revitalizing the Climate Menu poster (linking climate change to changes in agriculture) and developing region-specific posters in advancing CoCoRaHS. The CC Program has a working relationship with DWR's Public Affairs Office to assist us with refining poster concepts that would be relevant to the audience we wish to educate.

Ag Mitigation and Stewardship (Jennifer) - During 2014 a plan was set forth to create a database of presentation material regarding agricultural GHG mitigation and climate change adaptation. The database has been created but the purview of issues is much larger than expected. The database will continue to develop with an extended timeframe for completion. The end goal would be to have a central database where members of the DWR Climate Change Program can easily obtain prepared slides for outreach events. K-12 curriculum regarding agricultural GHG mitigation and climate change adaptation is being developed. A 4th-8th grade level brochure is in draft form, with plans for a K-3rd and 9th-12th grade brochure to be developed in 2015. The brochures are intended to introduce students to the basic concepts as well as promote DWR in an interactive, easily digestible manner.

Citizen Science (Pete and Lauma) - Citizen Science was promoted through many of the Regional Water Management Group (RWMG) meetings held throughout the state in 2013 and 2014. The DWR Climate Team focused on informing stakeholders about citizen science by promoting the Community Collaborative Rain, Hail & Snow (CoCoRaHS) network, whose state coordinators include California's climatologist housed in DWR. Northern Region Office's climate change specialist serves as one of the regional coordinators for CoCoRaHS in northern California. Staff provided brochures and flyers on the network, especially to many of the RWMGs in Southern Region, and invited the NRO specialist to conduct a webinar in 2013 on CoCoRaHS for the Santa Ana Watershed RWMG's Government Alliance Pillar, which is co-chaired by the U.S. Bureau of Reclamation and the U.S. Army Corps of Engineers. This information was later integrated into the Santa Ana Watershed's IRWM Plan, "One Water, One Watershed 2.0 Plan." CoCoRaHS also was integrated into DWR's Project WET (Water Education for Teachers) pilot workshops in Oroville and Visalia. In addition to presentations on CoCoRaHS, raffles were conducted in each of the workshops to give away a rain gauge suitable for citizen science. CoCoRaHS was further promoted at California's first Adaptation Forum in 2014 with another rain gauge raffle.

Climate Change Mitigation - In 2014, DWR expanded the amount and specificity of the information it is providing to document monitoring and compliance with the DWR GGERP. In addition, DWR adopted a 2010 Emissions Baseline in 2014 in an effort to improve its GHG emissions reduction efforts and bring its reduction efforts in line with the highest industry standards.

Climate Change Metrics (for use by local, regional, other managers) – This project is on hold, with an expected resumption date of mid-2015.

DWR Climate Literacy - The Climate Change team presented 5 day-long Climate Literacy classes in 2014. Designed to inform DWR staff and managers about observed and projected climate changes in California, as well as connect impacts to DWR work, the sessions are given at the 101 and 201 levels. In March, 101 and 201 were held for 56 participants in the Sacramento Training Center. On September 30 and October 1, 101 and 201 were held in the Southern Regional Office in Glendale for 22 SRO staff, including five staff from the Colorado River Board, and a representative from Heal the Bay; and on December 9, 28 additional staff were trained in 101 in Sacramento. New in 2014 was content on the various phases of the Climate Action Plan, and Tribal vulnerabilities and engagement on climate change issues. The Climate Literacy Classes are designed via collaboration between Climate Hawks, the State

Climatologist Office, the Bay-Delta Modeling Group, the State Water Project Power and Risk Office, and the Division of Flood Management.

Climate Change Technical Advisory Group – In 2014, the CCTAG began work on **"Perspectives and Guidance for Climate Change Analysis, Memorandum Report to California Department of Water Resources"** DWR's Climate Change Technical Advisory Group will provide this report to DWR by the conclusion of the CCTAG term, in March, 2015. Topics to be covered include introductory background on DWR's previous and current handling of climate change analysis for various projects; General Circulation Model selection for water resources investigations in California; approaches for extremes such as flood and drought under climate change; downscaling methods and their appropriate use for various types of studies; comments regarding specific DWR project applications; and other future work that might be considered by DWR in the future.

Local Government Assistance – A list of resources for local governments considering climate change has been developed, but is in need of updating. A revised list will be prepared in 2015. There may be an opportunity for re-engagement with the City of Fresno (test case for Hawks involvement in local gov't planning efforts) based on a request for involvement from Kate Meis of the Local Government Commissions who is coordinating a 'Civic Spark' initiative in Fresno in 2015.

Climate Change FAQs and Responses – A preliminary list of climate change 'frequently asked questions' and standard responses has been created. The list contains questions that DWR Climate Hawks have been asked while giving presentations, as well as common questions about climate science or aspects of climate change that are likely to be asked at some point in the future. The point of the list is to ensure that Hawks have vetted, readily available standard responses for challenging climate change questions that may be asked of them. The list will be distributed to Hawks by spring 2015.

Website Update - In 2014, the DWR Climate Change website was updated with new publications, DWR Climate News posts, GHG emissions reports and updates, and local and regional resources. Also in 2014, a new page was added to the DWR Climate Change Website to provide information on the Water-Energy Nexus. This page will be expanded significantly in 2015 to include new information developed for Water Plan 2013 and additional content.

Exhibits – DWR Public Affairs is in the process of developing new standards for exhibits. No new locations were identified in 2014. Michelle will continue to work with Public Affairs on the new standards, specifically portions pertaining to climate change.

<u>Presentations by Climate Team Members and Associates</u>

Michael Anderson

"*California Drought: Current Conditions and Future Possibilities in a Changing Climate*" - Climate Action Team Public Health Working Group, February, Sacramento

"*Climate, Drought, and Change*" - Delta Science Brown Bag Seminar –August – Sacramento

"*Drought – The New Normal?*" - Floodplain Management Association – September – Santa Clara

"*Climate, Drought, and Change*" – Stanford Workshop on Water Governance and Climate Change – September – Stanford University

Panel on Climate Change and Atmospheric Rivers - Tahoe Climate Science Symposium, November, Lake Tahoe

John Andrew

Citizens Climate Lobby, February 11, Berkeley

California Water Law and Policy, February 25, UC Santa Cruz

Statewide Emergency Planning Committee, March 25, Mather

Green Cities California, May 13, Mill Valley

US Department of Energy, Quadrennial Energy Review, June 19, San Francisco

Beahrs Environmental Leadership Program, July 23, UC Berkeley

Ecological Society of America, August 14, Sacramento (with Erin)

Stanford/Melbourne Climate Change and Water Governance Workshop, September 25, Stanford

International and Executive Program, College of Natural Resources, October 5, Berkeley

GHG Regulations, Continuing Legal Education (CLE), October 7, San Francisco

Drought Forum, Western Governors' Association, November 14, State Capitol

Environmental Law and Policy, November 20, UC Davis

Rhone River Water Managers, Institute of International Studies, December 15, UC Berkeley

Erin Chappell

"*Climate Change Impacts: Delta Hydrology*", Delta Conservancy Climate Change Symposium, February, West Sacramento

"*Climate Change Impacts: Bay-Delta Region*", Water Education Foundation Bay-Delta Tour, June, Sausalito

"*Integrating Climate Change: Science and Policy in Water Planning*", Ecological Society of America Annual Symposium, August, Sacramento

"*California Water: Overview and Climate Change*", Uzbekistan delegation, August, Sacramento

"Climate Action Plan Phase 3", Environmental Scientist Conference, October, Sacramento

"*Climate Change Activities at the Department of Water Resources*", FEMA meeting, November, Oakland

Pete Coombe

"*California Climate 101*," Department of Water Resources and Water Education Foundation Project WET Workshop, April, Oroville

"*Community Collaborative Rain, Hail & Snow Network: A Rain Gauge at Every School*," Department of Water Resources and Water Education Foundation Project WET Workshop, April, Oroville

"*Citizen Science and CoCoRaHS*", Chico Floodplain Ecology Institute, July, Chico

"*Citizen Science and CoCoRaHS*", Guest lecturer CSU, Chico – Concepts in Environmental Science, October, Chico

"*Climate, Past and Present in the Almanor Basin Region*", Almador Basin Watershed Forum, October, Chester

Elissa Lynn

"*Climate Change and DWR, Brownbag*" December, DWR Public Affairs Office, Sacramento

Lauma Jurkevics

"*Adaptation and Mitigation in a Changing Climate*," Department of Water Resources and Water Education Foundation Project WET Workshop, April, Oroville

"*Successful Integrated Planning,*" Mojave Water Agency Dedication Program: Celebrating Success, May, Apple Valley

"*California Climate 101,*" Department of Water Resources and Water Education Foundation Project WET Workshop, May, Visalia

"*Community Collaborative Rain, Hail & Snow Network: A Rain Gauge at Every School,*" Department of Water Resources and Water Education Foundation Project WET Workshop, May, Visalia

"*Climate Change Resources at the Department of Water Resources,*" Public Workshop: Climate Adaptation Planning for Small & Medium Water Systems, Case Study of Lompoc Valley, June, Lompoc

"*Sustainability Successes at the Department of Water Resources*," Southern California Gas Company Annual Green Event, August, Downey

"*Climate Change Resources at the Department of Water Resources*," Inyo-Mono Regional Water Management Group Meeting, October, Bishop

"Climate Change – Another Factor in Floodplain Management," Department of Water Resources National Flood Insurance Program Class, December, Oceanside

Poster presentations

"*Climate Change: Stressing Our Water Systems*," Department of Water Resources and Water Education Foundation Project WET Workshop, April, Oroville

"*Climate Change: Stressing Our Water Systems*," Department of Water Resources and Water Education Foundation Project WET Workshop, May, Visalia

"*The Past, Present, and Future of the DWR Climate Program,*" Lauma M. Jurkevics, Michelle Selmon, Erin Chappell, Peter Coombe, and Andrew Schwarz, Department of Water Resources and Water Education Foundation Project WET Workshop, April, Oroville

"*The Past, Present, and Future of the DWR Climate Program*," Department of Water Resources and Water Education Foundation Project WET Workshop, May, Visalia

"*Incorporating Sea-Level Rise and Zone of Flooding Information into Coastal Planning*," Adolfo Luna III, Lauma M. Jurkevics, Marisa Villarreal (Ocean Science Trust), Aaron McGregor (Ocean Science Trust),

and Maria Lorenzo-Lee, Floodplain Management Association 2014 Annual Conference: Keeping Our Heads Above Water, September, Santa Cruz

"*Incorporating Sea-Level Rise and Zone of Flooding Information into Coastal Planning,*" Department of Water Resources 22nd Annual Environmental Scientist Workshop, October, Sacramento

Jennifer Morales

"*Adaptation and Mitigation in a Changing Climate*," Department of Water Resources and Water Education Foundation Project WET Workshop, May, Visalia

Andrew Schwarz

Safeguarding California Plan Public Meetings- Water Sector Presentation, January, Sacramento and Truckee

"*The Water-Energy Nexus: Understanding the Risk & Impact of Operations*" - Climate Leadership Conference, February, San Diego

"Water Management in California"- American River College Natural Resource Management 300 Lecture, March, Sacramento

"*Sustainable Water Management*" - Association of Environmental Professionals Conference, March, Huntington Beach

"The Water-Energy Nexus: Understanding the Risk & Impact of Operations" - American Water Works Association, March, Anaheim

"Water-Energy Nexus" - Presentation to WETCAT, May, Sacramento

"Preparing your Water Resource System for Climate Change." - Southern California Water Education Seminar, August, Southern California

"Climate change and water management in California" - Presentation to Uzbekistani delegation, August, Sacramento

"Water Management in California" - California State University at Sacramento- Natural Resource Management Course Lecture, October, Sacramento

"*Climate Change Analysis in CEQA"* - CEQA Continuing Legal Education Conference, December, San Francisco

Michelle Selmon

Dailey Elementary 3rd grade presentation, May, Fresno

"Climate Change Vulnerability Assessments in the California Water Sector" - California Climate Adaptation Forum, August, Sacramento

"San Joaquin Regional Climate Variability and Projected Impacts" – Fresno Water Sector Emergency Response Workshop, September, Fresno

Capitol Region Climate Readiness Collaborative, September, Sacramento

"*Landscape Conservation Cooperatives*" – CCTAG meeting, November, La Jolla

"Communicating Climate Change to California Water Managers" – UC Merced Climate and Drought Communication Workshop, November, Merced

Additional Goals for 2015

In order to maintain a 'fresh and relevant' website, regular review and updating will be needed. Website Review will continue to be a standing agenda item, and all O/E Team members will have an opportunity to suggest changes. Additionally, it was decided at the December 2014 meeting that O/E Team members will be on a rotating assignment for a 15-20 minute review of the website. When assigned this task, the O/E Team member will click on each page associated with the DWR Climate Change website and will search for outdated materials (or hyperlinks) to be removed, opportunities for the addition of new material, and other glitches or problems that decrease the effectiveness of this outreach and education resource.

Climate Hawk Lauma Jurkevics will lead the O/E Team meetings in 2015.

Office of the California State Climatologist

Dr. Michael Anderson-

Over the past year the California State Climate Office has been involved in a variety of projects and collaborations that apply to this technical coordinating committee. The efforts are in the areas of design hydrology, volunteer observing networks, extreme precipitation monitoring, and drought. Data services are provided via phone, fax, email, and web services.

A new project was launched in 2008 to begin the deployment of weather monitoring equipment to assist in the forecasting and monitoring of extreme precipitation conditions in California. The project is a partnership effort between DWR, Scripps Institute of Oceanography, and NOAA's Earth Systems Research Laboratory (ESRL). Three types of instrumentation are to be deployed in this project: GPS-Met (water vapor), soil moisture, and vertically pointing radar (freezing level). Deployment of the instruments is finishing up and new storm diagnostics from the new data streams are being developed. Data transfer into the California Data Exchange Center is still being pursued.

Calendar year 2013 set a new record for dryness at the state level. Winter 2014 and 2015 set new records for warmth. The April 1 snow pack of 2015 is on pace to be the smallest since 1950 at about half of the previous low set in 2014 and 1977. The ongoing drought is providing many opportunities to evaluate drought impacts and water management from the perspective of a changing climate.

As part of the State's Climate Action Team, the Research working group developed a five year research plan to help guide the State's investment in climate change research. The plan is being finalized and is expected to be released in the spring of 2015.

In its sixth year of operation, the CoCoRaHS California effort has signed up more than 1200 volunteers covering 55 of California's 58 counties. Over 10,000 daily precipitation reports are entered each month. The program provides an opportunity for the State Climatologist to interact with the multiple weather forecast offices that serve the state and is providing insight into the spatial variability of rainfall at the event scale.

Work continues on developing information to inform flood planning efforts in a changing climate. Vulnerabilities in the flood management system have been identified and potential impacts from climate change have been described along the lines of impact to system vulnerabilities. Further research and development will be pursued to assist the State's flood planning efforts.

The State Climatologist has been involved in related work at the regional level in examining the benefits of advanced monitoring for extreme precipitation in the San Francisco Bay region and exploring the benefits of forecast informed reservoir operations. Work to date has involved participation in work groups and speaking engagements.

Collaboration continues with the Western Region Climate Center, the National Oceanographic Atmospheric Administration Regional Integrated Science Assessment California Nevada Applications Program, the Department of the Interior Southwest Climate Science Center, and the United States Department of Agriculture Southwest Climate Science Hub. Collaborative efforts with the United States Bureau of Reclamation and United States Geological Survey also continue. Collaboration and funding of climate services task orders with the University of California also continues. Work is wrapping up on the United States Forest Service Sierra Nevada Adaptive Management Program, a collaborative state-federal effort to examine the watershed impacts of different fire-treatment methods.

Climate Change Matrix Team

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